REMARKS

This reply is in response to a Non-Compliant Amendment. Applicant has amended the Amendments to include the proper status identifier for the claims.

The remaining portion of these Remarks is identical to that in the Response to the Office action mailed March 24, 2005 to the USPTO:

Claims 1-16 are pending, and stand rejected under 35 U.S.C. §§ 112, first and second paragraph and under 103(a).

Claims 2 and 10 has been cancelled.

Claim 1 was amended to include the limitation of original claim 2.

Objections to the Specification:

The trademarks NAFION and ACIPLEX were used in the Specification without being capitalized. The Specification has been amended to capitalize these trademarks.

35 U.S.C. §112

Claim 10 stands rejected under 35 U.S.C. §112, first paragraph and 35 U.S.C. §112 second paragraph. Claim 10 has been deleted, making said rejections mute.

Description of the Invention

Applicant's invention relates to a method for preparing membrane electrode assemblies (MEAs), and in particular to a method of manufacturing a proton-conducting cation-exchange electrolyte membrane for use in a membrane electrode assembly (MEA), in which atmospheric pressure plasma deposition is used to deposit catalysts such as platinum onto a polymer substrate, or a substrate including carbon cloth or carbon particles. The invention has two principal characteristics:

1) The noble metal catalyst is deposited on the membrane by discharge enhanced chemical vapor deposition (DECVD); and

2) The DECVD is carried out at atmospheric pressure, without adding noble gases to the DECVD carrier gas.

35 U.S.C. §103

Dearnley in view of Schutze and further in view of Fornsel

Claims 1-5 and 11-13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Dearnaley (US Patent Number 6,159,533) in view of Schutze and further in view of Fornsel (WO 01/32949, US 6,800,336). The references fail to teach or suggest all of Applicant's claim limitations, as amended, thus no *prima facie* case of obviousness is presented. Specifically, the references fail to teach or suggest a method for manufacturing a cation-exchange membrane by DECVD, where the deposition is carried out at atmospheric pressure without adding a noble gas to the DECVD carrier gas.

The Dearnley reference discloses a vapor deposition method for depositing a catalyst on a fuel cell electrode under vacuum. The Dearnley reference fails to disclose Applicant's method using a carrier gas, and at atmospheric pressure. The Dearnley reference is silent on not adding a noble gas to the carrier gas – since no carrier gas is involved. The Dearnley reference not only fails to teach or suggest two critical limitations in Applicant's claims (carrier gas and an atmospheric pressure process), it teaches away for Applicant's claims by requiring a vacuum deposition and void of a carrier gas. One in the art would not be motivated to practice Applicant's atmospheric, carrier gas method from the vacuum process without a carrier gas disclosed in the Dearnley reference.

The Schutze reference is a secondary reference cited to show a plasma atmospheric pressure method of depositing thin films. The Schutze reference begins by describing the many disadvantages of using vacuum methods, such as that disclosed in Dearnley, providing no motivation for one in the art to combine these two references.

The Schutze reference teaches a plasma jet using flowing helium. As amended, Applicant's amended claims cite a method without adding noble gases to the DECVD carrier gas. The Schutze reference not only fails to teach or suggest Applicant's claim limitation of no added noble gas, but teaches away from Applicant's claims by requiring a noble gas. The Schutze reference fails to correct the deficiencies of the

Dearnley reference, fails to teach or suggest Applicant's claim limitations, and teaches away from Applicant's claims.

The Fornsel reference describes the use of an atmospheric plasma method for reacting monomers to form a polymer coating on a striated substrate. The Fornsel reference fails to teach or suggest Applicant's claim limitations of a method for producing a cation-exchange electrolyte membrane, the deposition of a catalyst layer, or a substrate of a polymer membrane, carbon cloth of carbon particle-containing membrane. Rather it teaches away from the coating of a catalyst layer on a membrane by describing only the reaction of monomers to form a polymer coating on a striated substrate. One would not be motivated to combine a method for applying a polymer coating (Fornsel), with a reference requiring a noble gas in metallurgy applications (Schutze), or with a vacuum method for depositing a catalyst on a membrane.

Picking and choosing specific elements from various references to recreate the claimed invention is not proper 35 U.S.C. §103 analysis. Applicant contends the obviousness rejection in this case is a classic example of hindsight, in effect using Applicant's claim as a template on which selected bits of prior art teachings can be assembled. This is not a proper basis for rejection of the claims.

Dearnley in view of Schutze, in view of Fronsel, and further in view of Hulett

Claim 6 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Dearnaley (US Patent Number 6,159,533) in view of Schutze in view of Fornsel (WO 01/32949, US 6,800.336), and further in view of Hulett (US 6,074,692). The Hulett reference is a secondary reference used to describe advancing the membrane beneath the nozzle. The Hulett reference describes an unrelated slurry-coated membrane method, which is very different from a vapor deposition method of forming a coating. In the Dearnaley reference describing a vacuum system, the enclosed area is so small as to prevent moving the membrane – and there is no nozzle. Thus the proposed modification would render the prior art unsatisfactory for its intended use, which is not allowed in a *prima facie* case of obviousness according to MPEP 2143.

Even if somehow these mutually exclusive methods were combined, the Hulett reference fails to heal the defects of the cited references, as described above.

Dearnley in view of Schutze, in view of Fronsel, and further in view of Yasumoto

Claims 7 and 10 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Dearnaley (US Patent Number 6,159,533) in view of Schutze in view of Fornsel (WO 01/32949, US 6,800,336), and further in view of Yasumoto (US 2003/0096154). The Yasumoto is a secondary reference cited by the Examiner to teach the spraying of the catalyst onto the surface of the polymer electrode membrane. Applicant's do not claim a method in which a catalyst is sprayed onto a polymer electrode membrane, but rather a discharge enhanced chemical vapor deposition method. Thus the Yasumoto reference fails to teach Applicant's claim limitations, and fails to heal the deficiencies of the other cited references.

Dearnley in view of Schutze, in view of Fronsel, in view of Yasumoto, further in view of Nanaumi

Claims 8-9 stand rejected under 35 U.S.C. 103(a) as being unpatebtable over Dearnaley (US Patent Number 6,159,533) in view of Schutze in view of Fornsel (WO 01/32949, US 6,800,336), in view of Yasumoto (US 2003/0096154) and further in view of Nanaumi (US 2004/0180250).

The Nanaumi reference is cited to cite polymer electrolyte membrane structures. However the Nanaumi reference fails to teach or suggest Applicant's many claim limitations, and fails to correct the many deficiencies of the other references cited.

Dearnley in view of Schutze, in view of Fronsel, further in view of Kamo

Claims 14 and 15 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Dearnaley (US Patent Number 6,159,533) in view of Schutze in view of Fornsel (WO 01/32949, US 6,800,336), and further in view of Kamo (US 2003/0059659). The Kamo reference is a secondary reference cited to show the use of a platinum alloy in the anode side of an electrolyte membrane. While the Kamo reference discloses a platinum/ruthenium alloy for a fuel cell electrode, the platinum/ruthenium alloy is supported on a carbon powder, rather than directly on a membrane as claimed by Applicant. In Example 2, the platinum/ruthenium alloy is screen printed using a slurry.

One in the art would not be motivated by this method alone – or in combination with the other cited reference to practice all of the limitations in Applicant's amended claims.

Dearnley in view of Schutze and Fronsel, further in view of Haug

Claim 16 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Dearnaley (US Patent Number 6,159,533) in view of Schutze in view of Fornsel (WO 01/32949, US 6,800,336), and further in view of Haug. The Haug reference is a secondary reference cited to show the deposition of multiple catalyst layers. The Haug reference demonstrates the use of a vacuum sputter deposition system for producing a PEM. The disclosure of a multiple layer of catalyst by methods teaching away from Applicant's claimed method fails to heal the defects of the cited art to present a *prima facie* case of obviousness.

Conclusion

The references cited, either alone or in combination, fail to teach or suggest all of Applicant's claim limitations, and therefore fail to present a *prima facie* case of obviousness over Applicant's amended claims. For the above reasons the present claims 1-16, as amended, are believed by the Applicant to be novel and unobvious over the prior art, thus the claims herein should be allowable to the Applicant. Accordingly, reconsideration and allowance are requested.

Respectfully submitted,

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